INTERNATIONAL EXHIBITION & CONVENTION CENTRE, DWARKA, NEW DELHI

Introduction

The New Delhi Exhibition and Convention Center (ECC), a flagship project of Government of India, is envisioned as a “World Class”, transit oriented, mixed use district, providing one of the largest facility of its kind in India and Asia.

New Delhi being the nation’s capital and the commercial nerve centre of northern India; it is one of the most productive business locations in India. Despite its sustained levels of growth and immense economic potential, there are very limited opportunities available in the NCR in terms of organized exhibition or large scale conference space.

The Exhibition Industry has not grown in tandem with the economic expansion and urban development of the city. For almost three decades, Pragati Maidan has been the only large, organized meeting space in the city for holding exhibitions, conventions, trade fairs, etc. Hence, a need was felt to establish a larger and more modern ECC facility in the NCR to provide exhibition space attracting new investments and boost existing economic activity in the region.

In the absence of world class exhibition and conference facilities, India has not been benefitted from the potential benefits of MICE Market and its share in the Global as well as Asian market is very small. In order to capitalize on this vast market potential and to drive India’s industry and associate with programmes such as Make in India, promote tourism & trade and commerce activities, the Department of Industrial Policy & Promotion (DIPP) has taken the initiative to develop a State of the Art Exhibition and Convention Centre at New Delhi. DMICDC is acting as the knowledge partner for development of this world class Exhibition and Convention Centre (ECC).

The goals of the Delhi-Mumbai Industrial Corridor (DMIC) are to strengthen the Indian economy by creating state-of-the-art, world class infrastructure and facilities to stimulate a globally-competitive environment that activates local commerce, enhances foreign investments and promotes sustainable development.

The project is planned at Sector 25, Dwarka, New Delhi, approximately 3kms from IGI Airport and well connected to Metro and road links. The project site is spread across 89.72Ha in a well-developed area in western end of Delhi adjoining the city of Gurgaon.

Project Vision

The project vision is therefore to create a state-of-the-art, world class Exhibition and Convention Centre for India. ECC is envisaged as an internationally-recognized, architectural icon with innovative design and novel green building features.

With the help of state-of-the-art technology and cutting-edge design, the ECC is intended to be launched as an international ‘brand’ to promote and stimulate future growth and development. The ECC will be an integrated complex with a host of mutually beneficial facilities; exhibition halls, convention center and meeting facilities, banquet halls, auditoria, hotels, F&B outlets and retail services. These components will have the ability to be utilized independently or in conjunction with each other, depending on the nature of the event.
The size and diversity of the project, suggests that each area will have unique features that define both, the challenges and the opportunities to stimulate investment and generate a desirable level of success. To that end, the concept for the facility has been worked with an in-depth and integrated physical development approach.

The facilities will be at par with the best in the industry worldwide, in size and quality; offering an efficient and quality setting for international as well as national meetings, conferences, exhibitions and trade shows. The project is envisioned to be on a scale of a Central Business District (CBD) with supporting retail space, commercial office space, hospitality, and entertainment and lifestyle opportunities for end-users.

State of the Art sustainable approaches to planning and implementation have been included in the ECC Dwarka project. The approach incorporates sustainable planning and design solutions and techniques in transportation, alternative energy production and energy conservation, water resource management, land use planning and building design to create cost-effective and measurable solutions for the district.

ECC is planned and proposed to be constructed in lines with green building principles and IGBC (Indian Green Building Council) platinum rating standards. The project will offer eco-friendly design, energy efficient systems, state of the art technology& compliance to all statuary regulations.

**Site Positioning & Connectivity**

The site is strategically located in close proximity to the Indira Gandhi International Airport, with fast and efficient transit connections to the City, the downtown areas of Delhi, and the suburban/satellite hubs of Gurgaon and Noida from the neighboring states of Haryana and Uttar Pradesh, respectively.

The site also has Delhi–Ahmedabad main railway approx 300 mts from the eastern side. The nearest station from site is Bijwasan Railway Station at an approximate distance of 3 km. This railway line connects the south-west parts of the NCR with Rajasthan, Gujarat, Madhya Pradesh and Punjab.

As such a world class convention facility is intended to serve a greater regional area as well as attract wider business opportunities from multi MICE actives.
The proposed site is evaluated on various parameters. The parameters included:

- **Visibility**
  - Location on a view corridor or roadway with high pedestrian or vehicular traffic
  - Proximity to other cultural assets, planned or existing
  - Distinct “front door” and “back door” operations and visibility/screening
  - Quality streetscape and landscape design

- **Transportation Accessibility**
  - 15 mins driving time to International Airport
  - Available High Speed metro connection from site to Airport and Central
  - Adjoining to proposed interstate Bus Terminus
  - Adequate local and regional transportation connections to the ECC via rail (local and regional) and road (local and regional), as well as a well-managed taxi and bus fleet.

- **Proximity to Amenities**
  - On site food and entertainment venues
  - Well-patrolled and well-maintained surrounding areas
  - Positive guest experience from “door to door”
  - Other support or entertainment amenities (i.e., retail, office, art and culture)

- **Simultaneous Operation Potential**
  - Adequate on-site parking capacity for multiple events
  - Receiving and docking space to facilitate simultaneous loading and unloading of events
  - Distinct entry and meeting spaces for simultaneous events
  - Multiple and/or sub dividable ballrooms

- **On Site Available infrastructure**
  - 3600 hotel rooms available on site
  - 27000 car parking space in basement
  - Additional hotel supply within a 5 to 10 minute driving distance from the ECC
Site Location and Boundaries

Located in Sector 25 of Dwarka Sub City, the ECC site is located in between a 100 m wide UER-II (Urban Extension Road) and UER-I, connecting NH 1, 10 and 8. Towards east of the site is 80 mtr wide Dwarka Expressway road dividing Sectors 25 and 26.

The adjoining road network will provide access to the following major projects in and around NCT Delhi, and are likely to carry a large volume of passenger and goods traffic:

- Dwarka Sub-City
- Integrated Passenger Terminal in Sector-21, Dwarka
- Indira Gandhi International Airport
- Inter State Bus Terminal
- Integrated Freight Complex
- Second Diplomatic Enclave and Golf Course at Sector-24, Dwarka.

The proposed site has well planned transport connectivity, including MRT connectivity. The site is in close proximity to the Delhi Metro Station in Sector 21. The blue line and airport express line presently terminates at this station. The airport express line is being extended for exclusive connectivity to the ECC complex. The expansion of airport express line will start along with development of ECC.

There are proposals to extend metro network from Sector 21 station southwards to Gurgaon, further enhancing the connectivity of the site. The Inter State Bus Terminal (ISBT), located in Sector 22, is diagonally opposite the proposed ECC site. The site is thus in very close proximity to a host of existing and proposed road, rail and transit links.
Final Site Boundary

Based on discussions within DIPP, DDA and MoUD, initially the site area was 154 Ha. in Sector 25 & 26 Dwarka for development of ECC and ACC.

Site area within Sector 25 (113 Ha.) was proposed for ECC and mixed use development and site falling in Sector 26 (41 Ha.) was proposed for ACC development.

Subsequently the site finally transferred by DDA to DIPP for development of ECC complex is 89.72 Ha vide Ministry of Urban Development notification 1144 dated 12th may 2016 under land use “Public Semi-Public (PS-1, socio cultural facility). The site is considered free of encroachments for all planning purpose.

The proposed site boundary is as per Fig 3.

Adjoining Facilities

- Proposed ISBT Site
  
  The proposed Interstate Bus Terminus (ISBT) site is located towards the north-west side of the site. This terminal will restrict buses from Rajasthan and Haryana to the periphery of Delhi. The traffic junction near this site needs to be carefully designed to avoid any collision from the ECC and ACC traffic

- Sector 21 Metro Station
  
  It is one of the most important metro stations as it is the junction station of Blue line and Airport Express line. The ECC site turns out to be more feasible because of its close proximity to this metro station that allows extension of airport express line.

- Diplomatic Enclave and Golf Course
  
  The site is in close proximity the new diplomatic enclave and upcoming new Golf Course proposed in Sector 24, Dwarka. The site for same has been handed over by DDA to Ministry of External Affairs.

- New rail station
  
  The site is approximate1 km from the proposed rail terminal in Sector 21. This new terminal will be the hub for all west and south west bound trains.

Height Restriction

The site is under the runway funnel of IGI Airport’s new runway 11-29. The site is approximately 2.5 km from the end of the western edge of the runway. Permissible height of structures within the proposed development is regulated in accordance with the provisions contained in the Ministry of Civil Aviation notification published in Gazette of India
For the master planning purpose 7-8 floors for each building is assumed which may increase/decrease or re-orientation of building blocks may change depending on the final height approvals from Airports Authority of India.

![Fig 4: ECC Site with Respect to Airport Runway 11-29](image)

**Land Use and Area**

The site, finally handed over to DIPP was on 6th Sep 2016 was 89.72Ha. The land use of this area falling in Zone-K-II (Dwarka) was changed through Ministry of Urban Development notification No. 1144 dated May 12, 2016 as under:

<table>
<thead>
<tr>
<th>s.no</th>
<th>Location</th>
<th>Area in Ha</th>
<th>Land use (MPD-2021)</th>
<th>Land use changed to</th>
<th>Boundaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Site at Sector-25, Dwarka</td>
<td>89.72 Ha.(excluding structure/un-acquired land)</td>
<td>Commercial (C-2)</td>
<td>Public Semi-Public (PS-1, Socio cultural facilities)</td>
<td>North: UER-II (100M wide road) East:80m wide road. West: 60m wide road. South: District Park/MP Green</td>
</tr>
</tbody>
</table>

Modification to the Master Plan for Delhi 2021 vide Ministry of Urban development notification no.1313 dated May 26, 2016 has been carried out permitting ground coverage of 40% with FAR of 120. Exhibition space, convention and meeting space to be minimum 40% of floor area. Retail trade, office spaces/commercial offices, Hotels and related activities shall be up to maximum 60% of floor area.
Development Strategy

The ECC is intended to be launched as an international brand to promote and stimulate future growth and development. The ECC will be an integrated complex with a host of mutual beneficial facilities; Exhibition Halls, Convention Center with Banquet Halls & Auditoria, Sports Arena, Open Exhibition Spaces, mixed use commercial spaces like Star Hotels, F&B outlet and Retail Services. These components will have the ability to be utilized independently or in conjunction with each other, depending upon nature of the event. The quality of businesses, facilities and lifestyle amenities provided will determine the positioning of the ECC and play an important role in attracting national and international events to locate here.

The ECC development will therefore consist of a best-in-class ECC facility, multi-use Arena and supporting Hospitality and commercial district facilities as part of the overall mixed-use development. The ECC District proposed over approximately 90 Ha. with a FAR of 120 will include Exhibition space, convention area, Hotels, commercial office and retail space and a multi-purpose Arena.

The ECC district include 200,000 sq. m. of Exhibition Halls, fronted with arched Foyer space measuring 50,000 sq. m, a convention Centre of 60,000 sq. m, a Sports Arena of 50,000 sq. m, Hotel spaces 275,000 sq. m, class- A offices 215,000 sq. m. and 170,000 sq. m. of Commercial Space for Retail & Entertainment. The built up area for the ECC would be 1,020,000 sq. m.

The size and diversity of the project suggests that each area will have unique feature that defines both, the challenges and the opportunity to stimulate investment and generate a desirable level of success.

The Exhibition Centre complex is anchored by the Convention Centre at its northern end and an iconic Financial Centre building in the south. The iconic building will house retail at the lower levels and offices on the top floors. The building can accommodate financial Centre within the entire commercial district. Between the two anchors, the Exhibition Centre is organized in a sequence of 5 exhibition halls, fronted by a large arched lobby. The lobby stretches in a shallow arch, gently enclosing and defining the open air exhibition spaces while responding to arrangement of the mixed use blocks at their eastern edge.
Proposed Ground Coverage

The original plan to develop the complex was with Ground coverage of 40% over 114 Ha. of land. This corresponds to 45.60 Ha of land available for footprints of building superstructure (Ground Coverage).

The revised site boundary of 89.72 Ha with permissible ground coverage of 40% allows only 36 Ha of land for building footprints against the earlier of 45.60 Ha.

The site falls in the air funnel of runway 1129 of IGI Airport and restricts vertical development over the site to 32-40 meters.

Exhibition area is primarily single story construction and key component of entire development program. Exhibition centre alone requires approx. 23 Ha of ground coverage against available of 36 Ha which is 64% of the available ground coverage.

Built up area for Exhibition Centre is approx. 23% of the total built up area.

To accommodate 77% of the built up area in 36% of total space available is not feasible. Therefore this requires relaxation in ground coverage to prevent further reduction in built up area which will have adverse impact on the feasibility of the project.

Therefore relaxation to the ground coverage norm of 40% of present to 45% as is required to utilize the site to its potential and accommodate the proposed entire development program is desired.

Proposed Development Mix

The land finally transferred to DIPP for development of ECC is 89.72 Ha. As per the Delhi master Plan 2021 (Min. of Urban Development, Gazette Notification 1313 dated 26thMay 2016), the permissible distribution of total built up area for ECC and Meeting areas has to be minimum 40% of total built up area. Maximum 60% of the total built up area can be used for commercial activities.

Total built up potential on the 89.72 Ha. of land with permissible FAR of 120 is 10,76,640Sq.m. Due to prevalent height restrictions, only 1,020,000 Sq.m. of built up area (FAR) for complete complex is used.

As per Gazette Notification, 40% of the total built up area has to be reserved for ECC which correspond to 408,000 Sq.m. This is way above the feasible area for ECC established as per market demand. Such big area will not attract international level operators which will eventually impact functionality of the whole complex.

The planned built up area for ECC component is 360,000 sq. m. which is 35% of the total planned built area of 1,020,000 sq. m. Therefore and hence, minimum built-up area of 40% of ECC component requires to be relaxed to 35% and increase to built-up area to commercial use requires to be increased to 65%. 
Parking for Exhibition and Convention Centre

Total parking requirement for the proposed project is as per guidelines prescribed in DMP 2021. Total parking proposed for ECC complex is 27,000 ECS.

The parking requirement has been calculated based on the requirements as specified in DMP 2021.

<table>
<thead>
<tr>
<th>Built Use</th>
<th>Area (in Sq.m.)</th>
<th>ECS/100sq. m</th>
<th>Total Parking (nos.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhibition</td>
<td>250,000</td>
<td>2</td>
<td>5,000</td>
</tr>
<tr>
<td>Convention</td>
<td>60,000</td>
<td>2</td>
<td>1,200</td>
</tr>
<tr>
<td>Arena</td>
<td>50,000</td>
<td>2</td>
<td>1,000</td>
</tr>
<tr>
<td>Retail</td>
<td>170,000</td>
<td>3</td>
<td>5,400</td>
</tr>
<tr>
<td>Hotel</td>
<td>275,000</td>
<td>3</td>
<td>8,250</td>
</tr>
<tr>
<td>Offices</td>
<td>215,000</td>
<td>3</td>
<td>6,450</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>102,0000</strong></td>
<td></td>
<td><strong>27,000</strong></td>
</tr>
</tbody>
</table>
Master Plan Concept

Fig 7: ECC massing plan

The masterplan is for development of what is to be India’s largest Exhibition Centre, together with a Convention Centre and a 20,000 seat arena and a mixed-use development.

The Convention Centre and the Arena are located at the northern end of the site, forming a highly visible icon and marking the entrance to the site. From this focal point, three main open spaces stretch towards the public park in the south: a sequence of large open air exhibition areas, a pedestrian retail street and a landscaped route connecting through the mixed-use (hotel and office) blocks and the retail mall.

The Exhibition Centre complex is anchored by the Convention Centre at its northern end and an iconic building in the south. The iconic building will house retail at the lower levels and offices on the top floors. The building can accommodate financial Centre within the entire commercial district.

Between the two anchors, the exhibition centre is organized in a sequence of 5 exhibition halls, fronted by a large Foyer. The Foyer stretches in a shallow arch, gently enclosing and defining the open air exhibition spaces while responding to arrangement of the mixed use blocks at their eastern edge.
Exhibition Halls

The organization of the five exhibition halls is led by its function. These spaces follow a rather rigid set of rules necessary for their performance. This, together with the logic of large span structures which included efficiency of material uses and economy of modular arrangement, led to their rectangular design and arrangement in pairs, with circulation and support services running through the middle. The functional requirements and structural logic resulted in large column-free exhibition spaces 72m wide and between 200 and 240m long.

The roof is creatively shaped into a series of leaning arches, creating a simple but powerful and dynamic setting which changes with movement of the observer. The arches also provide opportunity for skylights, enabling natural daylight inside the halls.

All the servicing and supporting facilities happen from the back, from the west side of the site. Here the road leading from the motorway feeds into servicing corridors located between the halls.

Convention Centre & Arena

Conference Centre and the Arena are conceived two round volumes with swirling facades, acting as a coda to the long lobby façade. The two volumes are connected by a high roof plane which provides shade to a large outdoor entrance plaza. Urbanistic ally this composition works as a hyper-sized portal, aligned with the main pedestrian route.
The two buildings are centrally arranged, with large congregation spaces with tiered seating in the centre, surrounded by supporting facilities. The field of play level of the Arena is located on the basement level, with servicing access at the same level. This arrangement allows for uninterrupted spectators' circulation and access on ground floor and two upper level tiers. Thus, the building can have an attractive and accessible frontage from all sides.

Facade of the Convention Centre and the Arena is envisaged of metal swirling rings draped around, allowing for daylight to penetrate the interior in a controlled manner and also to lit up during night time. The night lighting could use different colors, patterns and be choreographed to transform the two buildings into a visual attraction and a piece of urban art.

Auditorium in the Convention Centre has capacity of 6,000 seats, with possible subdivisions. A smaller theatre of 600 seats is also provided. The main visitors' access to the auditorium is from the ground level and the first level tier. The first level accommodates the key adjoining spaces: meeting rooms, VIP lounge overlooking the plaza, VIP restaurant leading towards a large ball room that can be used as a spillover space for the visitors during intermissions, or independently as a wedding hall.

In the largest capacity, the hall can host up to 2,200 people and can also be subdivided into smaller venues. The hall is located at the first level between the convention centre and the first exhibition hall, leaving the ground level permeable and overlooking the main entrance space.

Guests of the wedding hall can access the space directly from the ECC lobby, and the lobby can be used as an attractive pre-function space. All the servicing facilities are shared with convention centre and have an independent access to the wedding hall from the back.

This option also proposes a hotel linked directly to the Convention Centre and the wedding hall. This arrangement provides direct links between the hotel lobby, auditorium and the wedding hall. Hotel accommodation is arranged in three volumes with lavishly landscaped roof terraces and swimming pools on top.
Mixed Use Development

The design of the mixed use blocks is expected to be led by requirements of their specific functions and future occupiers. However, there are some general principles set out by the masterplan. The blocks are envisaged as perimeter blocks varying in heights. Here shown in a more generic form, the taller elements dispersed across the complex are envisaged to provide opportunities for more expressive forms.

The volumes are dimensioned according to expected uses – hotel and office on upper levels and retail and food and beverage on the ground floor. The main pedestrian spaces are lined with colonnades and each block has an opportunity for attractive arrival space and entrance. The courtyards of pleasant dimensions are enclosed within the perimeter volumes, with opportunity for restaurants and cafes to animate them.

Together, courtyards can be interconnected with secondary pedestrian paths and form a landscaped urban lattice. These spaces could be passively cooled through provision of water features and pleasant shade of local plant species. The dynamic volumes of individual blocks, diverse in nature, could be tied together in a harmonious whole by using similar façade materials. These could be traditional local materials such as red sandstone supported by details in contemporary high performance materials. Shading structures should be a common motif all around, on facades, roof tops and public spaces, helping to achieve a more sustainable development.

In this masterplan option, car parking is located at three underground levels below the part of the halls, conference centre and the arena. The entrances to the underground parking are at the northern and southern ends of the complex. The mixed use blocks and the shopping mall have basement parking with separate entrances from the east.

The proposed development program for ECC facility is planned to be developed in two major phases (Phase 1 & Phase 2) over next 8 years.

Development Phases

Phase I

The prominence of growth is on development of Exhibition and Convention facility with gross building size of 100,000 sq. m. (Convention - 60,000 sq. m. & Exhibition – 40,000 sq. m.). In the later phase the overall ECC facility is expanded to 260,000 sq. m. (Convention 60,000 sq. m. & Exhibition 200,000 sq. m.).

The phase 1 would also include development of complete infrastructure including major Trunk Services, its connectivity and disposal to rising mains, internal Road network system,
underground Car Parking facilities, external Road network system and connectivity to major carriage ways. This would also include development of some part of planned commercial segment (Hotels & Retail)

The phase 1 would include following:

- 40,000 sq m of Exhibition Centre i/c part of Foyer
- 60,000 sq m of Convention Centre
- 230,000 sq m of Retail and Office Space
- 95,000 sq m of Hotel Space
- Associated infrastructure for entire 89.72 Ha of ECC site

The total planned development of Ph-1 would be 425,000 sq.m.

Phase II:

Development of phase II shall include remaining exhibition spaces and retail, Sports Arena and development of branded luxury, mid segment, budget/economy hotels and Serviced apartment.

The phase II would include following:

- 210,000 sq m of Exhibition Centre i/c Foyer
- 50,000 sq m of Sports Arena
- 155,000 sq m of Retail and Office Space
- 180,000 sq m of Hotel space

The total planned development for Phase-II would be 595,000 sq.m.

Sustainable approach to planning and design solutions and techniques in transportation, alternative energy production and energy conservation, water resource management, land use planning and building design to create cost effective and measurable solution for the district are considered.

The environmental impact of the building design, construction and operation will be significant. Green building practices to substantially reduce or eliminate negative environmental impacts and improve existing unsustainable design, construction and operational practices are used.

Trunk Infrastructure

The Services Systems for the project have been conceptualized based on past experience and acceptable National & International design standards. Effort shall be made to conceal all services and still provide access to these for accommodating changes in requirement in future. Conservation of energy, optimization of resources, eco-friendliness and State of the art technology shall be the key factors in the design concept to ensure least downtime and reduce maintenance hassles.

Every effort shall be made to design, layout and install equipment in locations which will tend to encourage routine preventive maintenance by providing easy access for operation personnel. Manual isolation will be provided to enable servicing, expansion or renovation of any part of the system without interrupting the services in adjacent areas.
- **Water Supply & Waste Water**
  
  o **Approach to Planning**
    
    a) Use of recycle water is mandatory requirement in the overall complex design
    b) Distribution of domestic, flushing and treated water from STP shall be phase wise to all buildings in 89.72 Ha.(221.6 Acre) development.
    c) The water storage tank capacity shall be adequate to ensure availability of water for 1.5 days’ requirement. Separate dedicated underground tanks are proposed for phase-I & II.
    d) Recycled treated waste water (from sewage treatment plant) for flushing, makeup to air conditioning & for horticulture water use.
    e) Implementation of MoEF recommendations relating to rain water harvesting, etc.
    f) Levels of roads / pavements and other services in the area.
    g) Drainage and water supply provision for Landscape layout.
  
  o **System Requirement**
    
    a) Water treatment plant (WTP) to ensure that the chemical and bacteriological parameters of water supply in accordance with World Health Organization (WHO) standards and IS: 10500.
    b) WTP shall be comprising of filters and hypo dosing units. However, WTP system design shall be verified for suitability prior to installation in accordance to latest water analysis report.
    c) Domestic & flushing water supply from WTP & STP by through Hydro-pneumatic system for making water available at the entry of all buildings within 89.72 Ha.(221.6 Acre) Development.
    d) Sewage and sullage collection & conveyance system based on ASPE standard and applicable guidelines by NBC.
    e) Storm water from the entire development shall be diverted to water pond & rainwater recharge pits and overflow shall be directed towards existing external storm water drainage system.
    f) Sewage treatment plant for treatment of sewage & sullage waste. The plant shall comprise of preliminary, secondary (chemical & biological) and tertiary treatment units.
    g) The treated effluent shall be recycled and reused for Soft water make-up to Air conditioning and DG Set cooling towers and if water is available, shall be used for landscape requirement of complete development. As per commitment to MoEF, it will be ensured to provide high flow UV System in tertiary treatment plant of STP.

Sewage, drainage and water supply services shall be separate for Phase-I&II.

The proposed area lies in K-II zone as per the DDA MPD-2021, which is the part of the overall master plan for Dwarka. According to the MPD 2021, a further 22.0 MGD of water is allocated for commercial usages.

Dwarka being within the municipal limits of the city of New Delhi, the Delhi Jal Board (DJB) is the Water Utility department responsible for all water treatment and distribution.

Source of water shall be municipal supply. Dedicated water treatment plant is proposed for phase – I & II separately for the whole development. The requirement of landscape irrigation and AC cooling tower soft water makeup, etc shall be sourced from the phase wise proposed from Sewage treatment plant.

The estimated water requirement for phase-1 & II development shall be as follows:
For phase-I

Total Water Requirement of Project - 4159 KL/Day
Fresh Water Requirement - 1994 KL/Day
Treated Waste Water Use - 2165 KL/Day

For phase-II

Total Water Requirement of Project - 5965 KL/Day
Fresh Water Requirement - 2859 KL/Day
Treated Waste Water Use - 3106 KL/Day

Underground water tanks, Pumping station and STP shall be located at two locations for phase - I and II development.

STP capacity for Phase-I - 2750 KLD
STP capacity for Phase-II - 3950 KLD

- Storm Water Network

Separate and independent rain water drainage system shall be provided for collecting rain water from roof, terrace, paved areas and roads through rainwater down pipes and shall be allowed to flow through sloping channels / pipes in external areas. Perforated pipe drainage system shall be provided for open-to-sky courtyard/lawn.

All the surface run-off shall be connected to the online storm water drainage network connected to rainwater recharge pits for recharging the ground water.

The overflow of the recharge pits shall be connected to the main storm water trunk line of the entire development. Rainwater drainage system shall also be design in phase - I &II.

- Electrical System

The Complex shall receive power supply from Delhi Transco substation through dual feeder, EHT from the nearby EHV substation 220/66 kV as per information received from BSES. Centralized DG power backup shall be provided for the Exhibition Halls, Convention Centre, Arena, Administration and common utility complex only.

As per preliminary calculations, total electrical load for entire complex is estimated as 100 MW (Phase I - 40 MW and Phase II- 60 MW). Gas Insulated Substation (GIS) shall be provided with 4 No. (3 working & 1 standby) ONAN (oil natural air natural) / ONAF (oil natural air force ventilation Transformers).

On load tap changer shall be provided for power transformers for better voltage regulation. Individual building shall receive the required power supply from this substation at 11 kV through U/G XLPE Cables in trenches in ring mains configuration.

Generators as back up to grid power shall be provided, in case of grid power failure. Emergency power generators shall produce power at 11 KV to Exhibition Halls, Arena Administration and common utility. All 11 kV generators shall be located in energy Centre, so that with auto changeover
system shall supply power from the main GIS sub-station to each local 11 KV sub-station located in nearby building of Exhibition Halls, Arena Administration and common utility.

11 kV HT supply shall be feed direct from the GIS by step down of voltage to other buildings in complex.

HT Metering will be provided for both feeders.

- **RCC Tunnel for Utilities and Trunk Infrastructure**

The housing of trunk utility services is designed for underground combined utility tunnels which offer advantage of hosting multiple services’ infrastructures inside an accessible and safe space, and of allowing regular inspections, maintenance and easy replacement. Utility tunnels are also often common on large institutional or commercial sites like of ECC, where multiple large-scale services infrastructure (gas, water, cooling water, power, heat, steam, compressed air, telecommunications cable, etc.) are distributed around the site to multiple buildings, without impeding vehicular or pedestrian traffic above ground. Due to the nature of these services, they may require regular inspection, repair, maintenance, or replacement, and therefore accessible utility tunnels are preferred instead of direct burying of the services in the ground. Utility tunnels range in size from just large enough to accommodate the utility being carried, to very large tunnels that can also accommodate human and even vehicular traffic.

- **RENEWABLE ENERGY SYSTEM**

  - **Solar Power**

Solar power system is a renewable energy system, converting the sunlight into electricity by using Photovoltaic Solar Panels. In Photovoltaic the light is converted into electricity by the use of photoelectric effect. The Solar power is ideally suited wherever sunlight’s are available. However, possibility of installing Roof top Photovoltaic Solar Panels at all buildings shall be explored.

As per solar system design calculations, 10 sqm area is required to generate 1 kWp of connected electrical load. Hence, it is advised to explore the possibility of installing of solar
photo voltaic system, which in turn shall be synchronized with the electrical system. This power supply shall be converted in AC power supply and will be synchronized with main grid power supply.

- **Solar Water Heating System:**

The solar water heating system is to be provided wherever hot water is required. The solar water heating system shall be 20% capacity or higher of total hot water requirement. The solar panel for hot water shall be provided at terrace of each tower wherever hot water required.

- **Solid Waste Management**

With the planned land uses such as Exhibition Halls, Convention Centre, Arena, F&B outlets and retail services, public amenities, hotels and service apartments, green and open spaces and a total expected visitor population of more than 3,79,500 people and about 56,500 employees and other floating population, solid wastes of different characteristics are likely to be generated from the international ECC. These will include domestic waste (general trash and domestic hazardous waste), commercial waste including packaging materials, paper, plastics, metal cans etc., street sweeping waste, green waste from landscaped areas, electronic waste and construction and demolition (C&D) waste.

Effective management of such huge quantities of waste is paramount to avoid any issues related to public health and environment protection. A comprehensive Solid Waste Management Plan to provide state-of-the-art, cost-effective, sustainable solutions to the problems related to solid waste shall be in place. The Plan shall be developed keeping in consideration, the international best practices in the field of solid waste management, suited to Indian conditions and complying with the statutory requirements, in consultation with the local civic body (South Delhi Municipal Corporation).

Collection of solid waste is assessed along with advanced collection options such as pneumatic waste collection, through underground pipes. The pneumatic waste collection system is based on a network of underground mild steel pipes through which a powerful airflow is created to transfer the waste to final point (collection station), where they are stored in containers.

The inlet doors to deposit the waste can be installed at any point of the buildings, in locations that are considered more visible and convenient for the operation. Feasibility shall be checked for installing twin waste chutes in buildings within ECC complex.

Feasibility of setting up a captive waste treatment /processing facility such as a biogas plant or an organic waste composter machine would be considered.
During Phase 1 development, it is expected that about 32-35 tonnes of municipal waste will be generated daily from different areas within the ECC. Maximum quantities are expected from Retail areas and Exhibition halls, where maximum footfall is expected.

During Phase 2 development, it is expected that about 42-45 tons of municipal waste will be generated daily from different areas within the ECC. Maximum quantities are expected from Exhibition halls, where maximum footfall is expected.

Along with the above mentioned sources of waste, roads and paving and other green areas are also expected to generate about 1.5 tons of municipal solid waste daily.

Based on the generic percentage composition of municipal wastes in India, it is estimated that out of 75 TPD of municipal waste, about 42-45 tons of waste will be biodegradable/putrescible in nature, 22-25 tons of waste will be recyclables and 12-15 tons will be inert/non-usable waste materials per day.

Biodegradable waste type shall include food waste, fruits & vegetable waste, paper & pulp, discarded meat scraps, dairy products, egg shells, fruit or vegetable peels, and other food items from serviced apartments, food stores, and restaurants, food commissary etc. constitute biodegradable waste. Such waste types need quick processing and treatment for its efficient management.

The solid waste management approach proposed for ECC shall be based on the principles of sustainability. There shall be focus on the key sustainability principles such as reduce, recycle and reuse, in addition to assessing the feasibility of energy recovery (such as biogas which can be used for captive uses), or producing compost using composter machines (and using the compost within landscaped areas of ECC) by suitably processing the solid waste.